



Rock Cycle



<http://web.bsu.edu/fseec/pie>

Topic:

The rock cycle

Indiana State Standards:

7.3.8 – Describe how sediments of sand and smaller particles, sometimes containing the remains of organisms, are gradually buried and are cemented together by dissolved minerals to form rock again.

7.3.8 – Explain that sedimentary rock, when buried deep enough, may be reformed by pressure and heat, perhaps melting and recrystallizing into different kinds of rock. Describe that these reformed rock layers may be forced up again to become land surface and even mountains, and subsequently erode.

Objectives:

- Students will be able to define igneous, sedimentary and metamorphic rocks with regard to the rock cycle
- Students will be able to explain the movement of earth materials through the rock cycle.
- Students will be able to explain that subjecting earth materials to heat and pressure is a process called metamorphism.
- Students will be able to explain that the melting and recrystallization of earth materials produces igneous rocks.
- Students will be able to explain weathering and erosion of earth materials produces sediment.
- Students will be able to explain that the compaction and cementation of sediment produces sedimentary rocks.

Materials:

Quantity (per student/group)	Item
1	Rock Cycle Sheet
1	Instruction Sheet
1	Dice
1	End of activity questions

Lesson background:

The continuous process where rocks change from one of three types to another is known as the rock cycle. The changes from one type to another can take many different paths.

Procedure:

1. Assign students to stations at random. Attempt to have an equal number of students at each station.
2. This activity assumes that students have had a brief introduction to the rock cycle. If not, the following sequence might be helpful.
 - a. Ask students if they think rocks can change. Hand out a copy of the rock cycle.
 - b. Explain to students the rock cycle is the framework upon which geologists understand how rocks slowly change from one type to another.
 - c. Show students examples of sediment and igneous, sedimentary, and metamorphic rocks. Ask if they can think of any ways to transform one of the samples to another.
 - i. Note: It helps if you use a sedimentary rock with larger clasts. Using sediment of the same size is also quite helpful.
 - ii. It is also sometimes helpful to break a rock into smaller pieces; thus, introducing weathering.
3. Explain to students that they are going to play a game where they will simulate the movement around the rock cycle.
4. At each station the students should roll the cube and proceed to the station identified. Sometimes they will remain at their station. Each time they roll the cube they should record that in their record sheet.
 - a. Make sure that students understand that each person needs to roll the cube for themselves. We don't want everyone going to the same place.
5. Observe students during the exercise. Answer questions as needed.
6. Have students begin the questions as they finish.

Closure:

1. Have students complete the question sheet.
2. Discuss with students why some parts of the rock cycle cannot be observed.

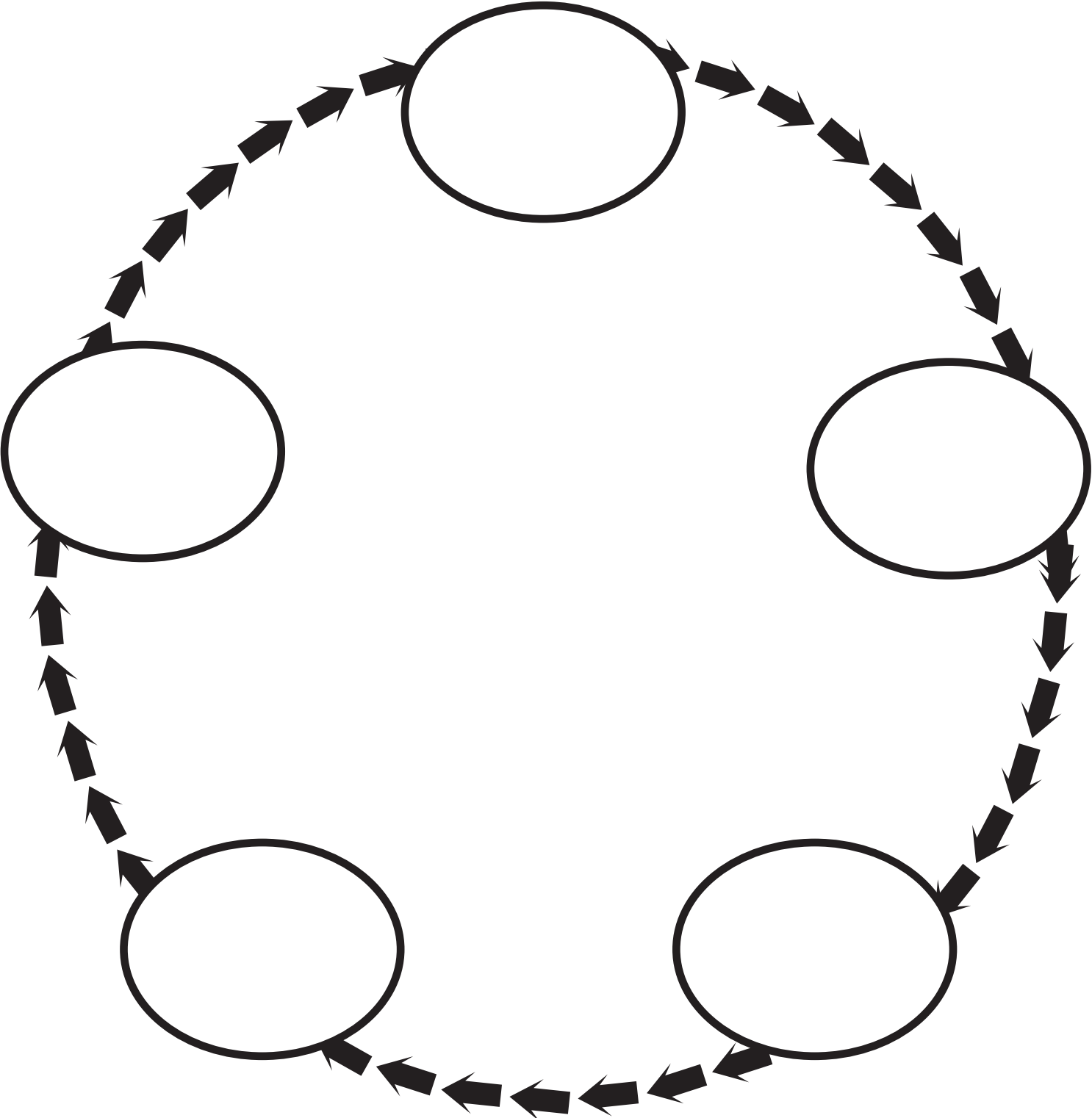
Directions:

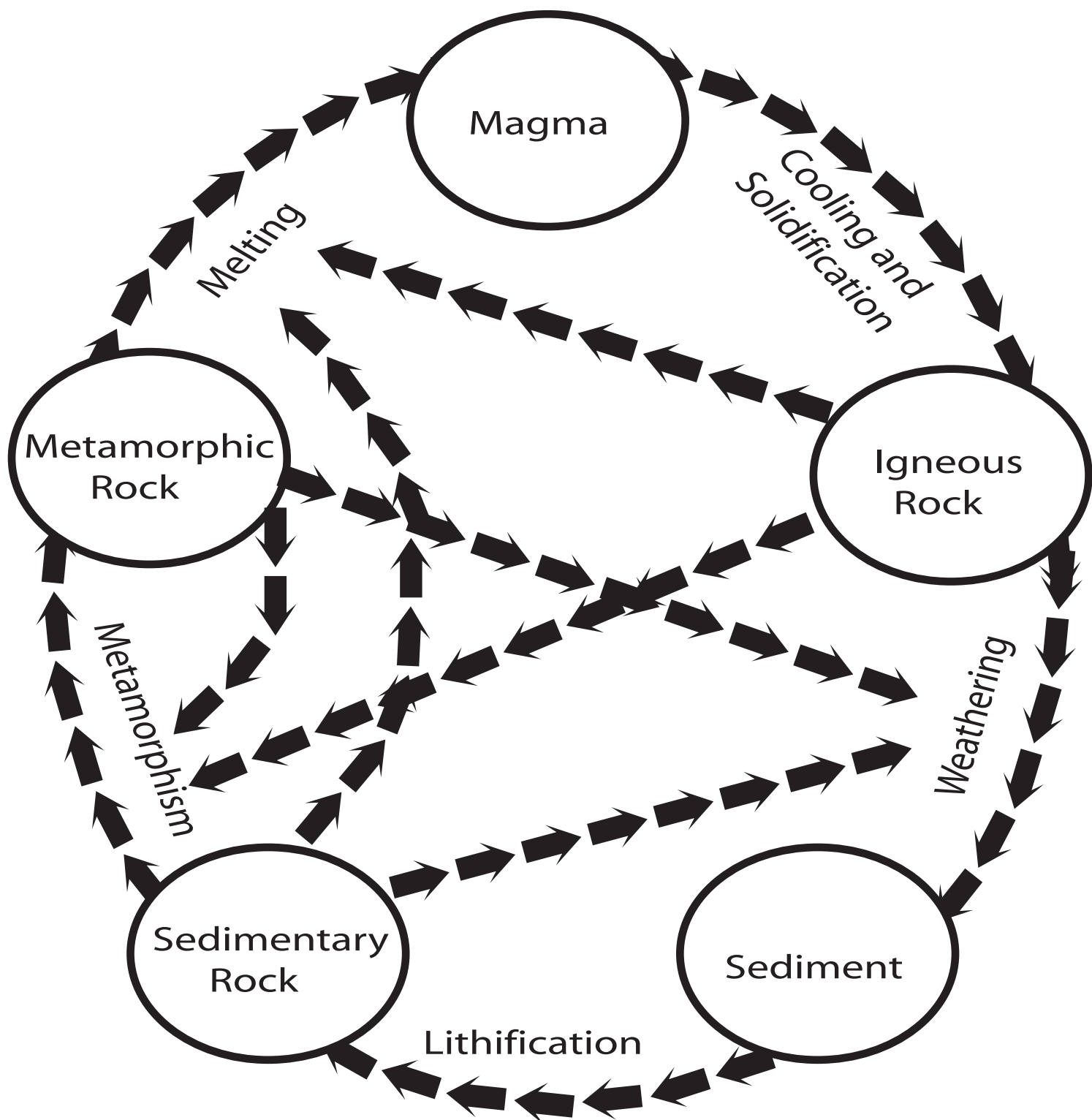
You are a piece of earth material traveling through the rock cycle. Starting from magma, roll the dice to determine your next step. Record your progress in a table for 20 steps.

Station	Roll	Time (Years)
		0
		200,000
		400,000
		600,000
		800,000
		1,000,000
		1,200,000
		1,400,000
		1,600,000
		1,800,000
		2,000,000
		2,200,000
		2,400,000
		2,600,000
		2,800,000
		3,000,000
		3,200,000
		3,400,000
		3,600,000
		3,800,000

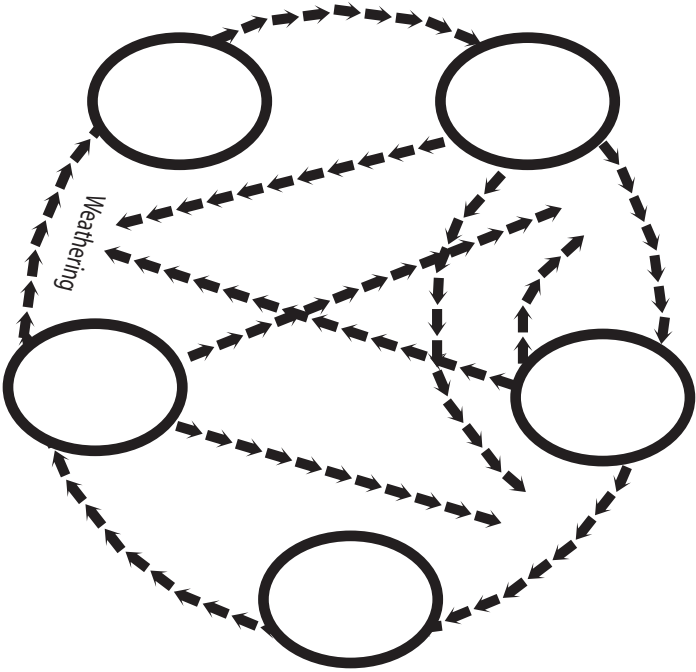
Questions:

1. Where did you spend most of your time?
2. Why is the rock cycle called a cycle?
3. What are the possible directions a sedimentary rock can take in this cycle?
4. Did all of your classmates follow the same path?
5. Does every rock follow the same path in nature?
6. How much of the rock cycle can be observed? How much is inferred? List specific steps in your answer.
7. How might the movement of material through the rock cycle affect people?
8. Assuming that each roll required 200,000 years, determine the average time it took for each of the following steps to occur.
Cooling to sediment: _____
Weathering to Igneous rock: _____
Metamorphic rock to weathering: _____

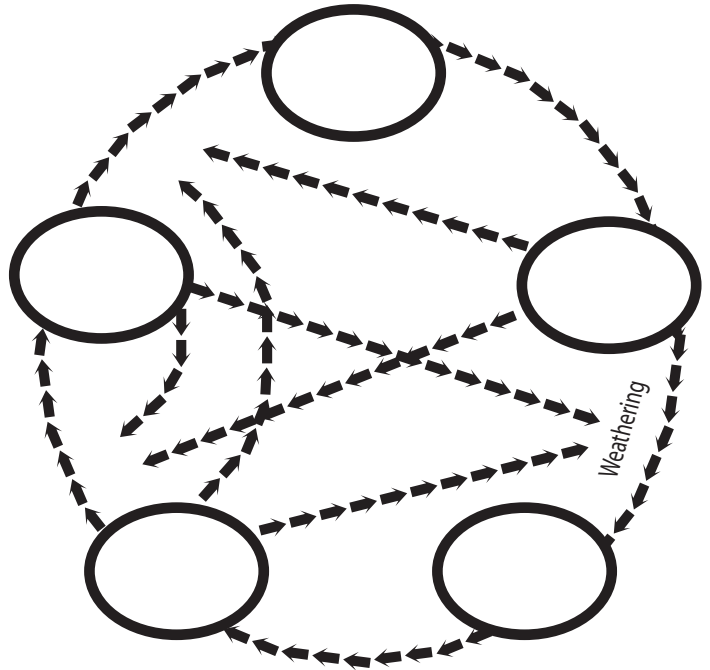


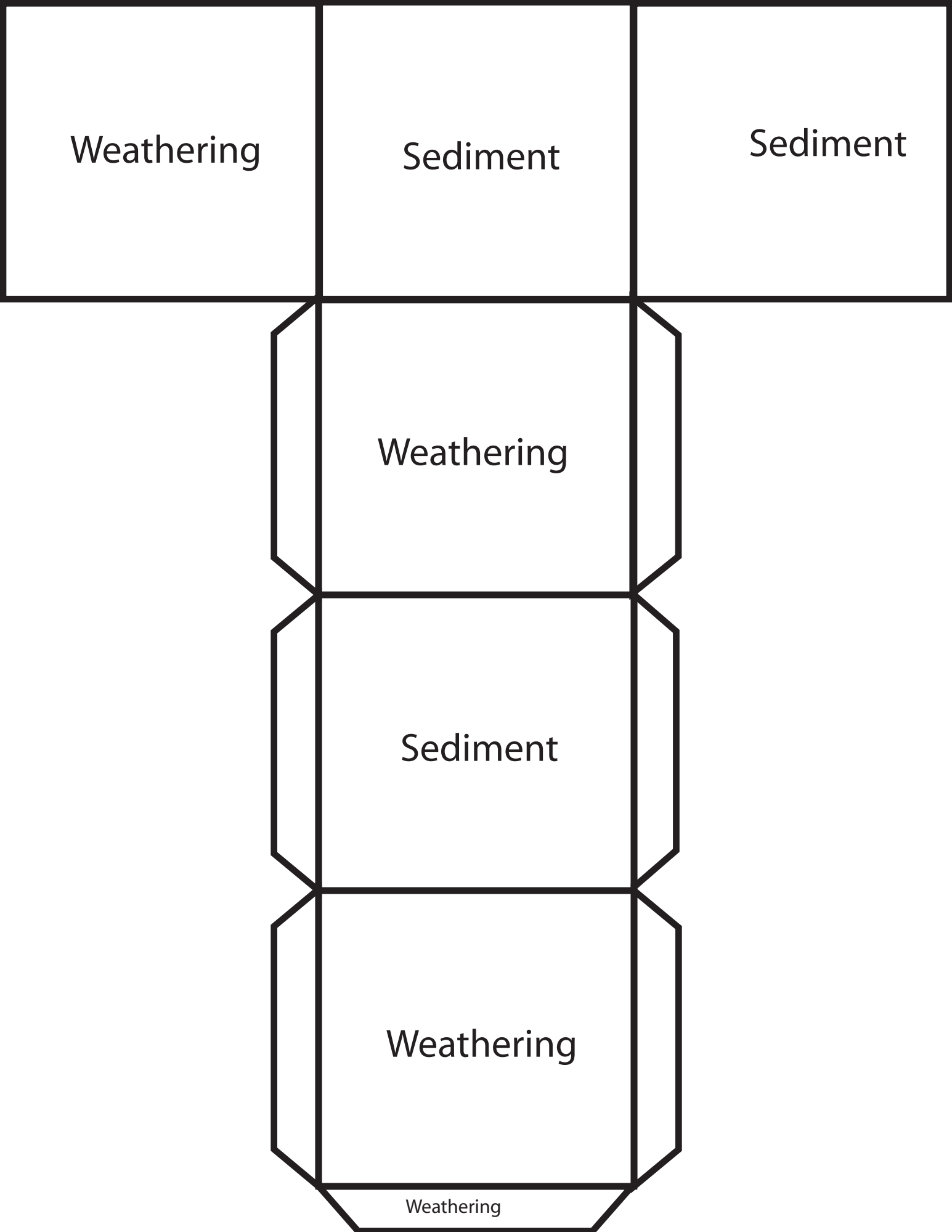


Weathering

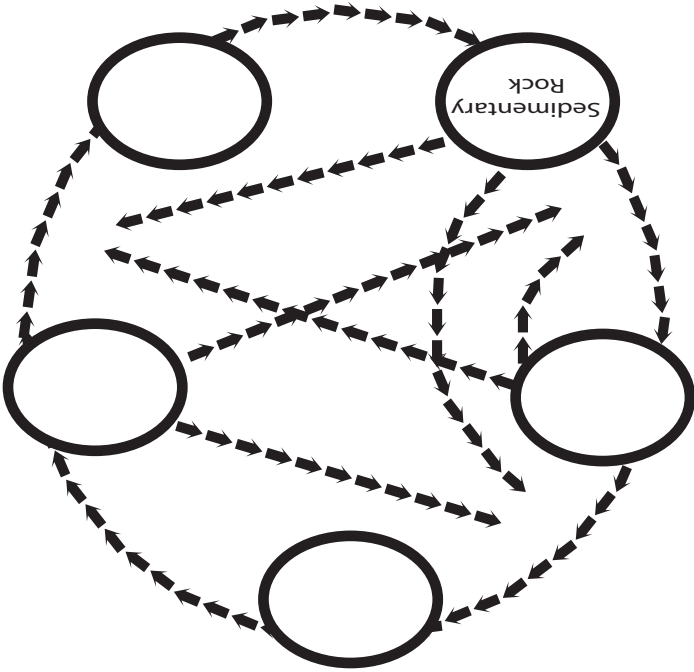


Weathering

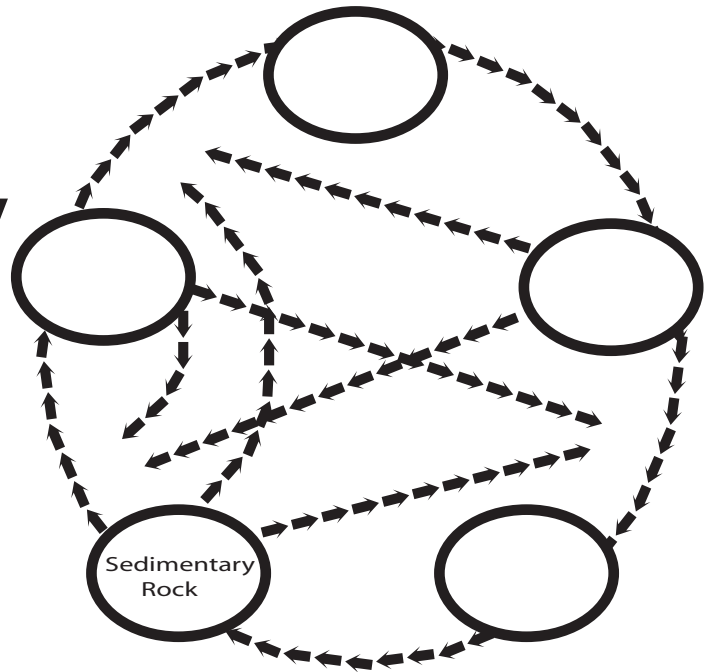




Rock
Sedimentary



Sedimentary
Rock



Metamorphism

Melting

Metamorphism

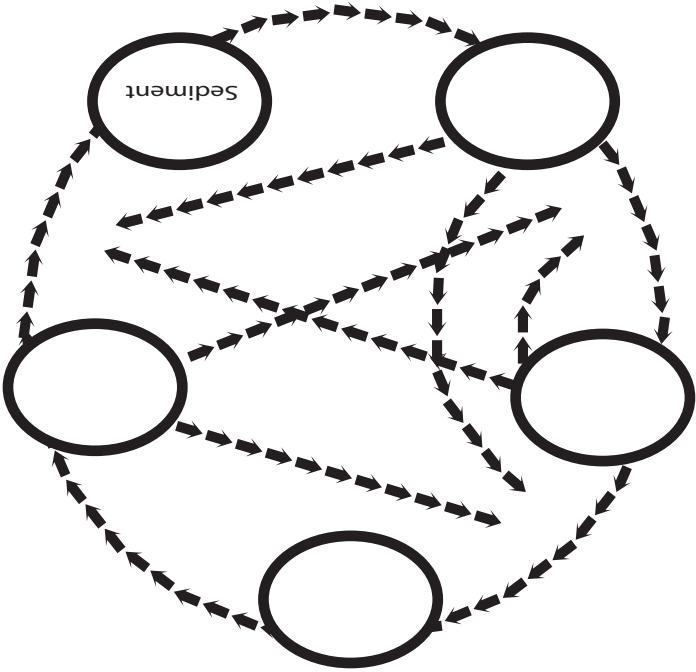
Weathering

Melting

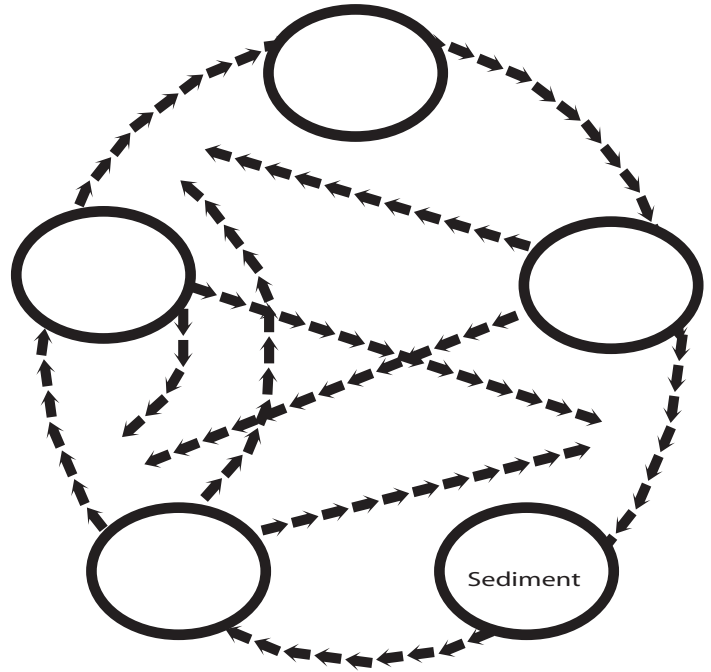
Weathering

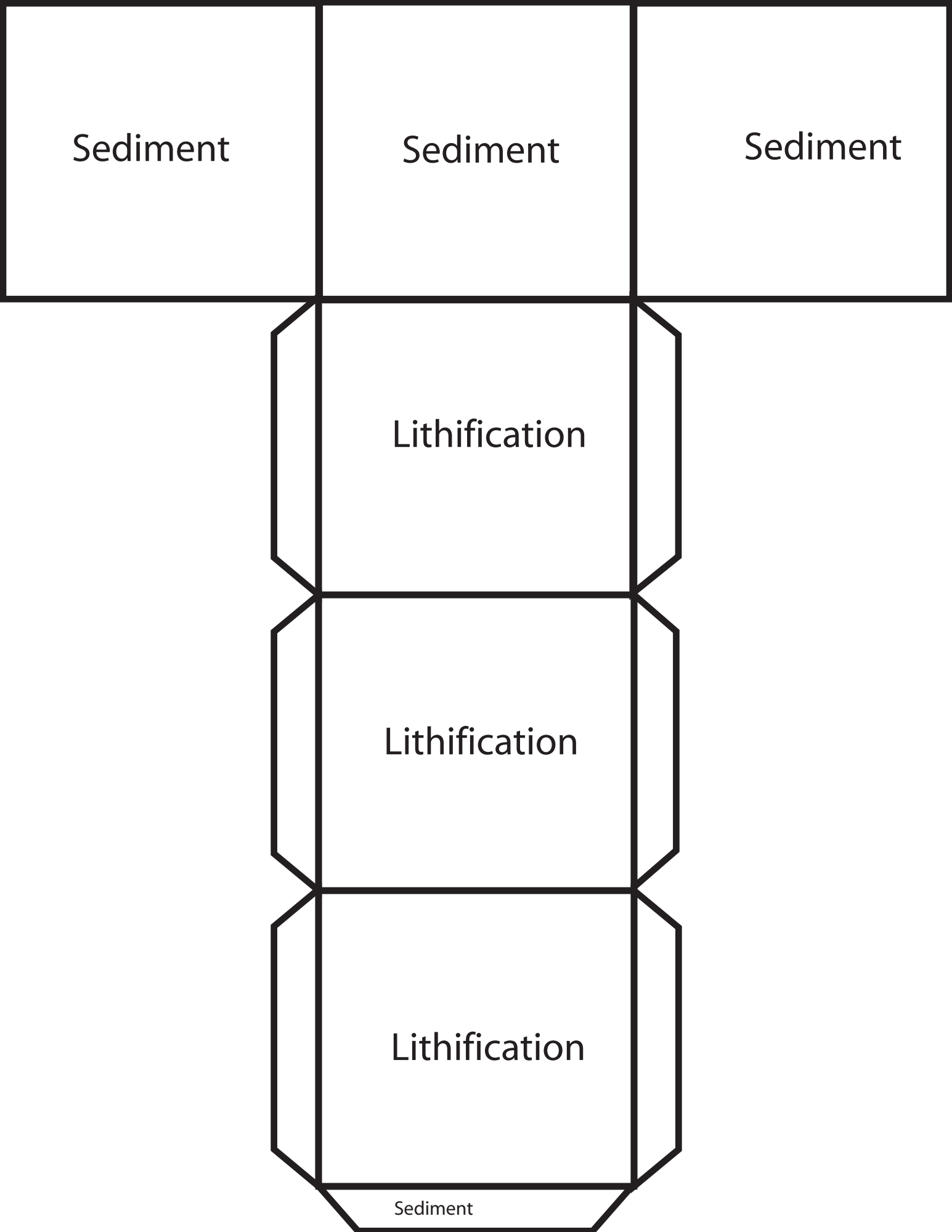
Sedimentary Rock

Sediment



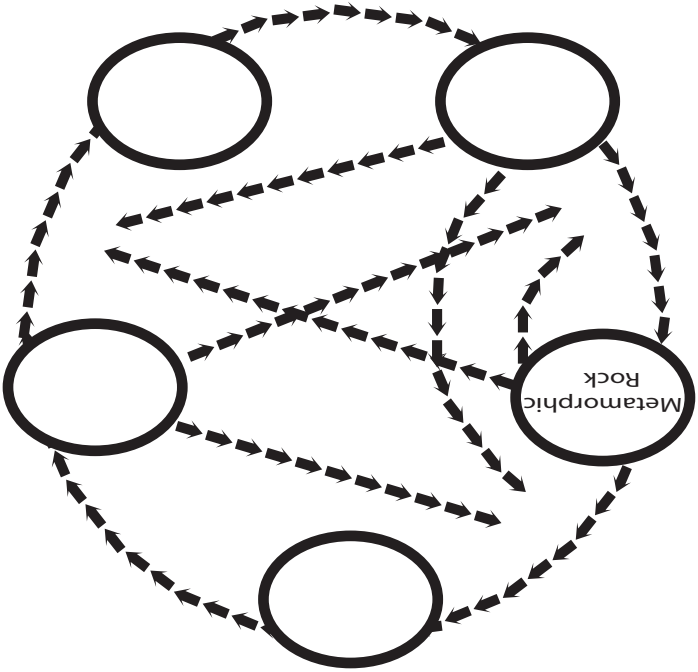
Sediment





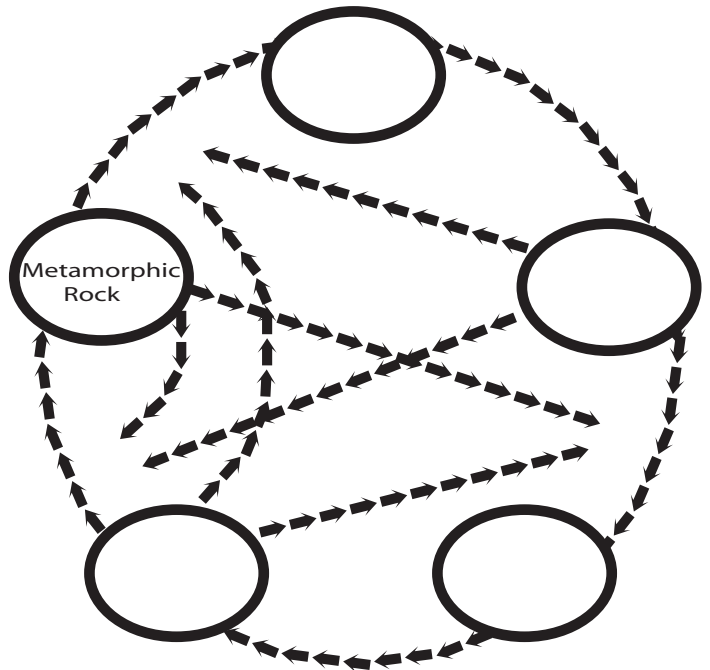
Rock

Metamorphic



Metamorphic Rock

Rock



Weathering

Weathering

Metamorphism

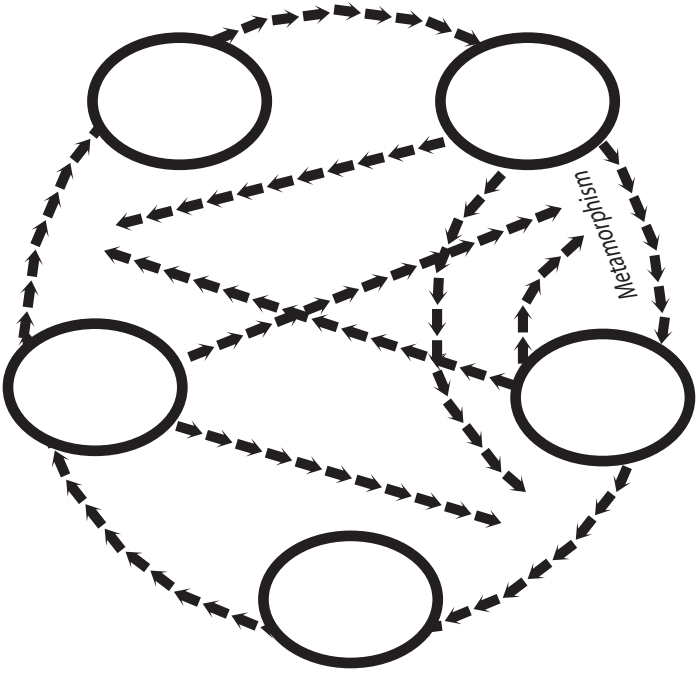
Metamorphism

Melting

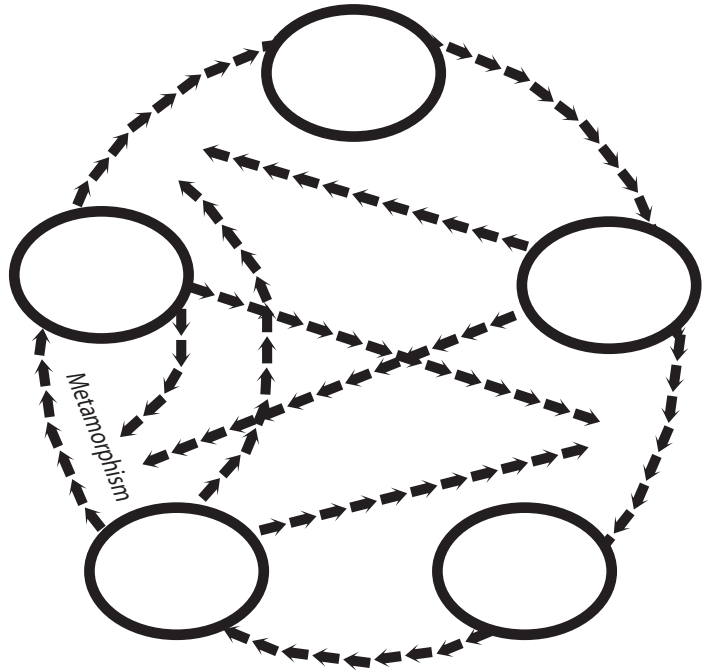
Melting

Metamorphic Rock

Metamorphism



Metamorphism



Metamorphic
Rock

Metamorphic
Rock

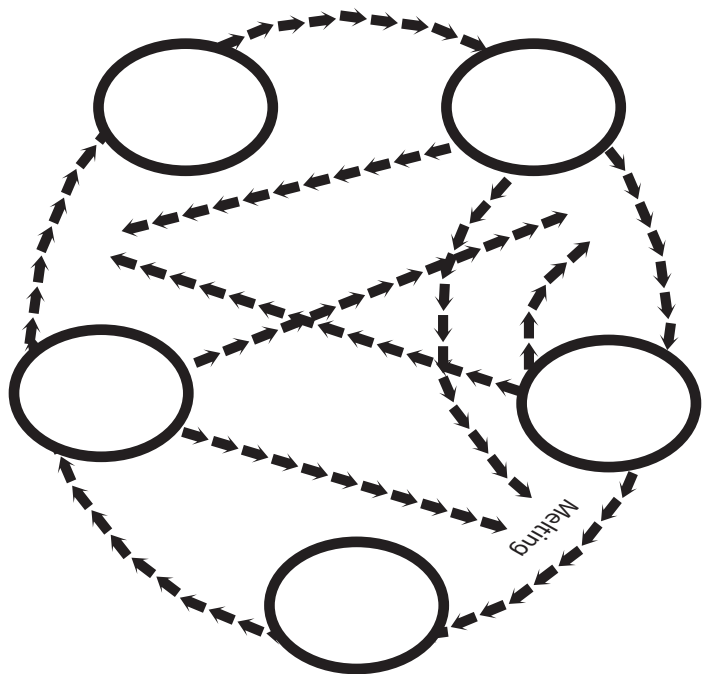
Metamorphic
Rock

Metamorphism

Metamorphism

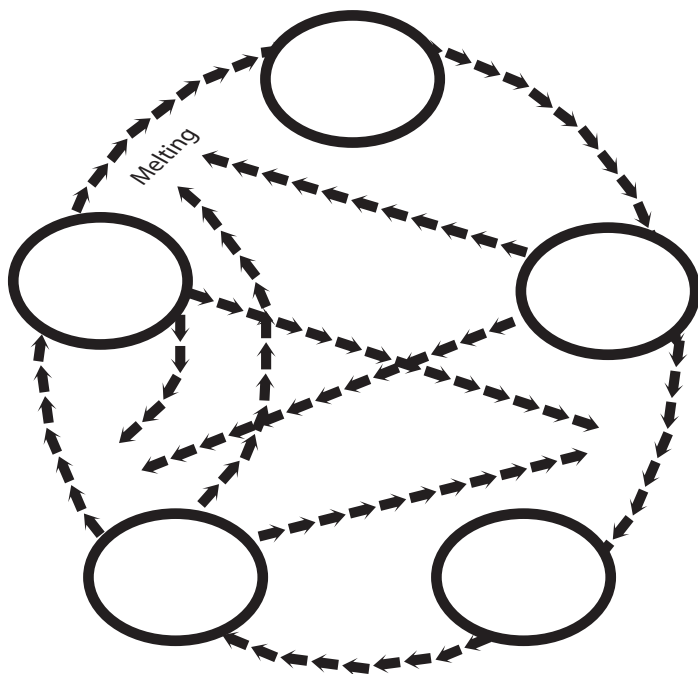
Metamorphism

Metamorphism



Melting

Melting



Melting

Melting

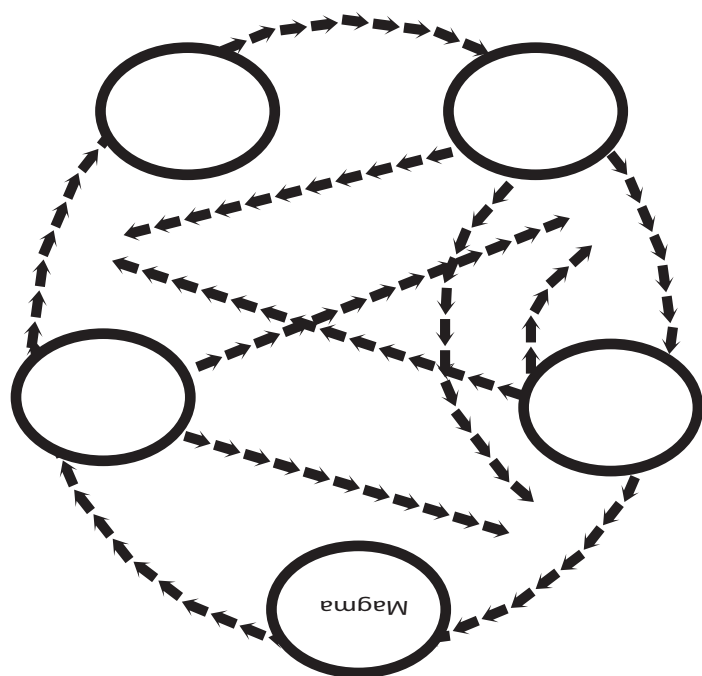
Melting

Magma

Magma

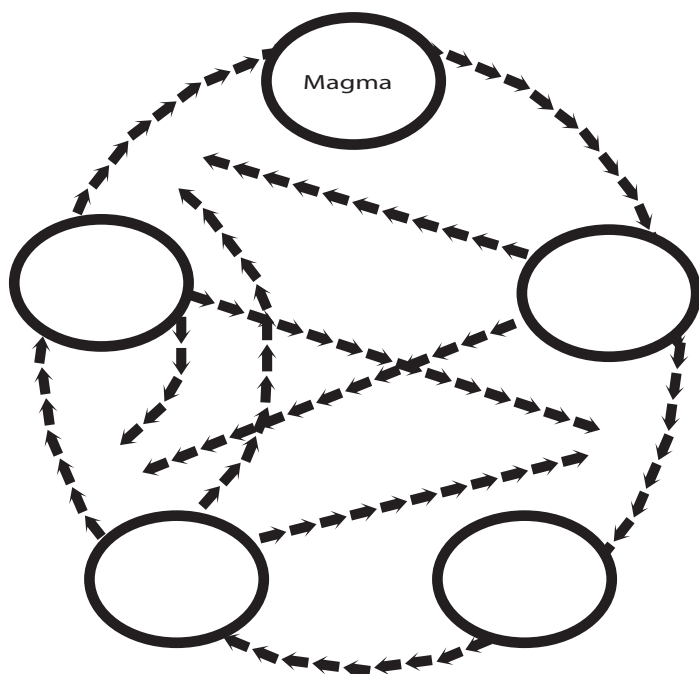
Magma

Melting



Magma

Magma



Cooling and
Solidification

Cooling and
Solidification

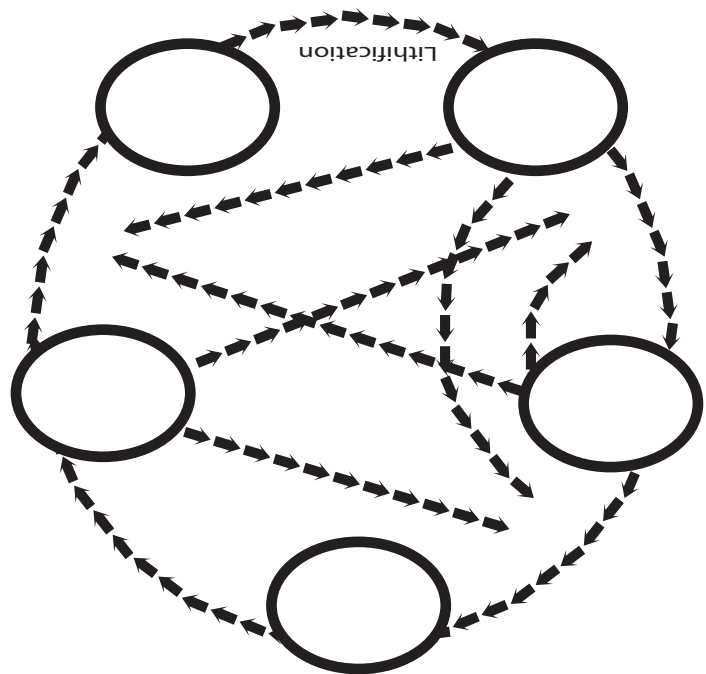
Cooling and
Solidification

Magma

Magma

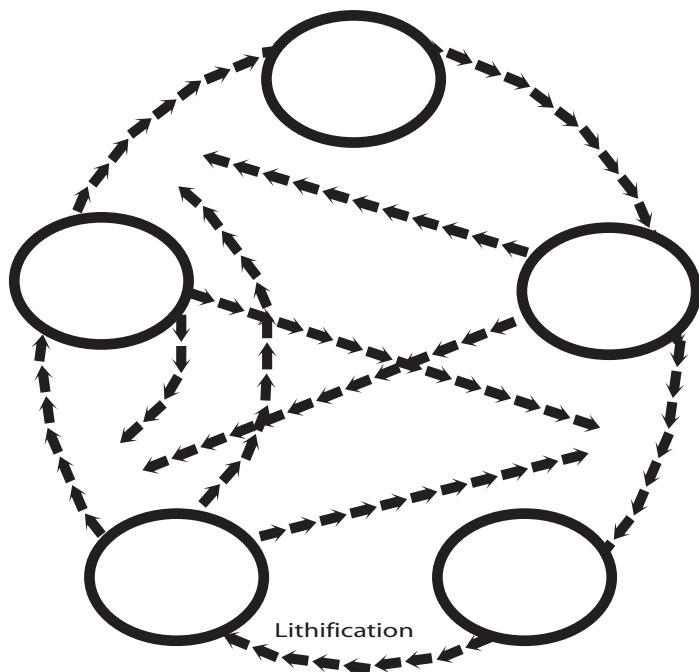
Magma

Magma



Lithification

Lithification



Sedimentary
Rock

Sedimentary
Rock

Sedimentary
Rock

Lithification

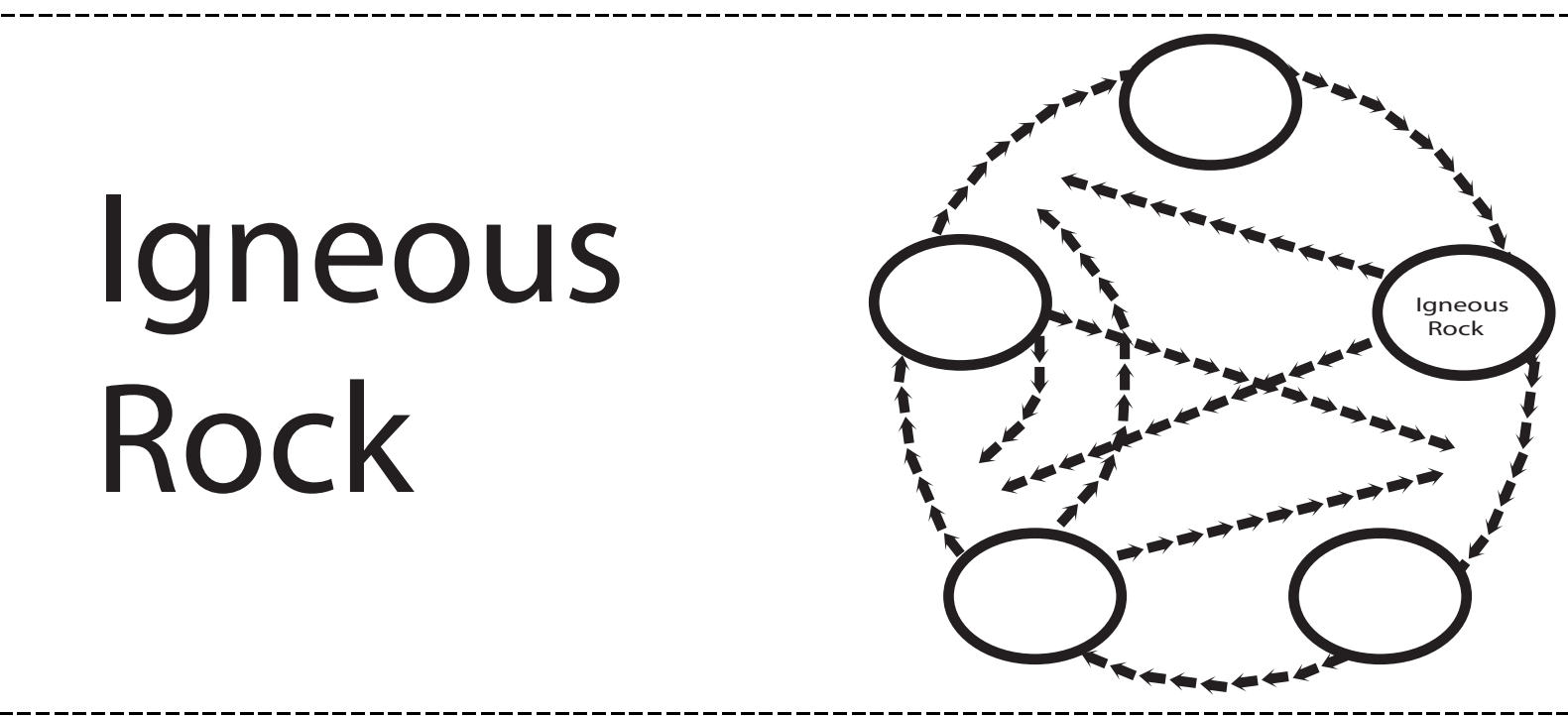
Lithification

Lithification

Lithification

The diagram illustrates the rock cycle with five circular nodes and arrows representing geological processes:

- Igneous Rock** (top node) can become **Sedimentary Rock** (middle node) through **Weathering and Erosion** (arrow).
- Sedimentary Rock** can become **Metamorphic Rock** (bottom node) through **Heat and Pressure** (arrow).
- Metamorphic Rock** can become **Igneous Rock** through **Melting** (arrow).
- Metamorphic Rock** can become **Sedimentary Rock** through **Weathering and Erosion** (arrow).
- Igneous Rock** can become **Metamorphic Rock** through **Heat and Pressure** (arrow).
- Sedimentary Rock** can become **Igneous Rock** through **Melting** (arrow).



The diagram illustrates the rock cycle using five empty circles and one circle labeled "Igneous Rock". Dashed arrows show the following sequence of transformations:

- Igneous Rock** (right) → **Sedimentary Rock** (bottom right)
- Sedimentary Rock** → **Metamorphic Rock** (bottom left)
- Metamorphic Rock** → **Plutonic Rock** (top left)
- Plutonic Rock** → **Igneous Rock**

Additionally, dashed arrows from each of the four empty circles point towards a central point, representing the process of melting that returns rocks to the magma state.

Metamorphism

Melting

Melting

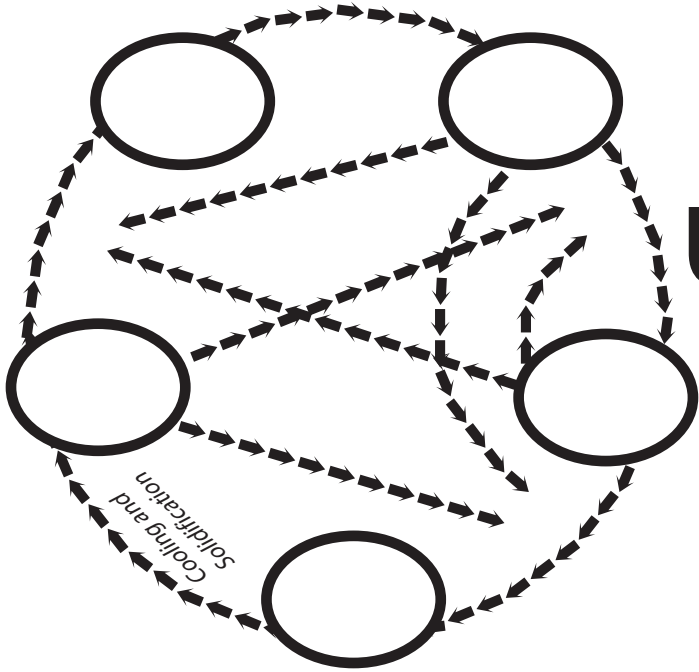
Metamorphism

Weathering

Weathering

Igneous Rock

Cooling and Solidification



Cooling and Solidification

